CLAIMS

1. A catheter comprising:

an elongated catheter body having a proximal end, a distal end and at least one lumen extending longitudinally therethrough; and

a mapping assembly mounted at the distal end of the catheter body and comprising at least two spines, each spine having a proximal end attached at the distal end of the catheter body and a free distal end, wherein each spine comprises at least one location sensor and at least one electrode.

2. The catheter of claim 1, wherein each spine comprises a tip electrode mounted at or near the distal end of the spine.

3. The catheter of claim 2, wherein the location sensor is mounted at least partially in the tip electrode on each spine.

4. The catheter of claim 1, wherein the location sensor is mounted at or near the distal end of each spine.

5. The catheter of claim 1, wherein each spine comprises a tip electrode and at least one ring electrode.

6. The catheter of claim 5, wherein the location sensor is mounted at least partially in the tip electrode on each spine.

7. The catheter of claim 5, wherein the location sensor is mounted at or near the distal end of each spine.

8. The catheter of claim 1, wherein each spine comprises a non-conductive covering having a support arm that has shape memory disposed therein.

9. The catheter of claim 8, wherein each support arm comprises Nitinol.

10. The catheter of claim 1, wherein the mapping assembly is moveable between an expanded arrangement, in which each spine extends radially outward from the catheter body, and a collapsed arrangement, in which each spine is disposed generally along a longitudinal axis of the catheter body.

11. The catheter of claim 10, wherein, when the mapping assembly is in its expanded arrangement, each spine extends radially outwardly from the catheter body and forms a curved shape.

12. The catheter of claim 10, wherein, when the mapping assembly is in its expanded arrangement, each spine extends radially outwardly from the catheter body and forms a substantially straight line.

13. The catheter of claim 12, wherein each spine is substantially perpendicular to the longitudinal axis of the catheter body.

14. The catheter of claim 1, further comprising an outer mounting ring secured within the catheter body and a mounting structure positioned within the outer mounting ring, wherein each spine is secured at its proximal end between the mounting structure and the outer mounting ring.

15. The catheter of claim 14, wherein the mounting structure has a plurality of flat sides.

16. The catheter of claim 15, wherein the number of sides on the mounting structure is equal to the number of spines of the mapping assembly.

17. The catheter of claim 1, further comprising a flexible tip section at the distal end of the catheter body, a control handle attached to the proximal end of the catheter body and a puller wire having a proximal end attached to a movable portion of the catheter handle and a distal end attached to the flexible tip section such that a relative longitudinal movement between the moveable portion of the catheter handle and the catheter body causes the puller wire to deflect the flexible tip section.

18. A catheter comprising:

an elongated catheter body having a proximal end, a distal end and at least one lumen longitudinally extending therethrough; and

a mapping assembly mounted at the distal end of the catheter body comprising at least two spines, each spine having a proximal end attached at the distal end of the catheter body and a free distal end, wherein each spine comprises a support arm having shape memory surrounded by a non-conductive covering, at least one location sensor within the non-conductive covering, and at least one electrode mounted on the non-conductive covering, wherein the mapping assembly is moveable between an expanded arrangement, in which each spine extends radially outward from the catheter body and a collapsed arrangement, in which each spine is disposed generally along a longitudinal axis of the catheter body.

19. The catheter of claim 18, wherein each spine comprises a tip electrode mounted at or near the distal end of the spine.

20. The catheter of claim 19, wherein the location sensor is mounted at least partially in the tip electrode on each spine.

21. The catheter of claim 18, wherein each spine comprises a tip electrode and at least one ring electrode.

22. The catheter of claim 18, wherein each support arm comprises Nitinol.

23. The catheter of claim 18, wherein, when the mapping assembly is in its expanded arrangement, each spine extends radially outwardly from the catheter body and forms a curved shape.

24. The catheter of claim 18, wherein, when the mapping assembly is in its expanded arrangement, each spine extends radially outwardly from the catheter body and forms a substantially straight line.

25. The catheter of claim 24, wherein each spine is substantially perpendicular to the longitudinal axis of the catheter body.

26. A method for mapping a region of the heart comprising:

introducing the distal end of the catheter of claim 1 into the region of the heart to be mapped;

positioning the mapping assembly so that at least one electrode from each spine is in contact with a first plurality of heart tissue;

recording electrical and locational data from the first plurality of heart tissue;

repositioning the mapping assembly such that at least one electrode from each spine contacts a second different plurality of heart tissue; and

recording electrical and locational data from the second plurality of heart tissue.

27. The method of claim 26, wherein the distal end of the catheter is introduced through a guiding sheath having a distal end positioned in the heart so that the spines of the mapping assembly are covered by the guiding sheath.

28. The method of claim 27, wherein the positioning and repositioning steps comprise moving the guiding sheath proximally relative to the mapping assembly.